

WHAT IS CLAIMED IS:

1. A resonance type of longitudinal double-mode SAW filter including a piezoelectric plate, comprising:
  - a first interdigital transducer that generates surface acoustic waves;
  - a second interdigital transducer that receives the surface acoustic waves that are generated by said first interdigital transducer;
  - a third interdigital transducer that is disposed between said first interdigital transducer and said second interdigital transducer that controls an amplitude of the surface acoustic waves that are generated; and
  - a pair of reflectors on disposed both sides of said first, second and third interdigital transducers in a direction in which said surface acoustic waves propagate (longitudinal direction X),
    - said reflectors and said first, second and third interdigital transducers being formed by periodically arranging metallic parallel conductors on said piezoelectric plate,
    - and a distance between a closest parallel conductor among said reflectors and said first and second interdigital transducers, being equal to a space or (one periodic length + space) between a line and the space possessed by one period of the interdigital transducers,
    - and an intersecting conductor 1 and an intersecting conductor 2 connected to a grounding potential side being arranged between said first interdigital transducer and said third interdigital transducer, and between said second interdigital transducer and said third interdigital transducer,
    - and wherein, if the wavelength of the surface acoustic waves is defined by  $\lambda$  and n is an integer of 0, 1, 2, ---, then, total lengths D1 and D2 of widths of the intersecting conductors and of space widths on both sides thereof are so determined by n which is in the range of from 1 to 10, that  $n(\lambda/2) + (1/4)\lambda$  or  $n(\lambda/2) + (3/4)\lambda$  is achieved,
    - and the lengths PT1, PT2 = PT1 of periodically arranging parallel conductors of said first and said second interdigital transducers, the length PTG of periodically arranging said third interdigital transducers, and the length PR of periodically arranging the reflectors, being so set as to satisfy relationships  $PT1, PT2 = < PR$ ,  $PTG/PT1 = PTG/PT2 = PTNG$ , and nearly all of higher-order natural mode oscillation displacements A0, S1 and A1 being made present in said first and second interdigital transducer regions, an electrode finger phase weighting is formed to correspond to a BPSK sign with which a phase sign changes into 0 or  $\pi$  at a polarity-changing point on an electrode charge distribution function

$Q(x)$  that generates on the electrode due to natural modes of oscillation thereby to select a single pair of natural modes existing stationary in a direction X of propagation of the surface acoustic waves that are utilized, to generate a symmetrical charge distribution state ( $Q(x)$ , -  $Q(x)$ ) and an obliquely symmetrical charge distribution state ( $Q(x)$ ,  $Q(x)$ ) to correspond to the regions of said first and said second interdigital transducers, and said PTNG in the region of said third interdigital transducer to be controlled is set to a range of 1.02 to 1.04 so as to couple the two together.

2. The longitudinal double-mode SAW filter according to claim 1, said piezoelectric plate being fabricated with STW cut which utilizes the surface acoustic waves that propagate in the direction of Z'-axis in a quartz Y-cut flat plate that is turned about an electric axis by 35 degrees to 42 degrees counterclockwise, and the ratio  $H/\lambda$  between the film thickness  $H$  of the aluminum electrode and the wavelength  $\lambda$  of the surface acoustic waves is 0.03 to 0.05, and

the sum  $M$  of electrode fingers forming the pairs of the interdigital transducers is 90 pairs to 150 pairs, and an intersection width of the electrode fingers corresponding to the sum  $M$  is in a range of 90 to 70 wavelengths.

3. The longitudinal double-mode SAW filter according to claim 1, reflection coefficient  $\gamma$  of the surface acoustic waves per an electrode finger of said first and second interdigital transducers being in a range of from 0.06 to 0.16.